3.3 Analysis of Variance (ANOVA)

We also examined the interactive effect of the two key classification variables (i.e., competitiveness and size) on the observed variation in average revenue (ARIEPS). Although several approaches could be considered, we assumed a general linear (Analysis of Variance) model with three levels characterizing size as follows:

Level	No. of Subscribers in System
Small	Less than 3,000
Medium	Between 3,000 and 15,000
Large	More than 15,000

Due to the relatively small number of competitive franchises, this stratification seemed adequate to capture a nonlinear "size" effect, if it exists. Consistent with our objective of accounting for economic factors, as well as enhancing the capability to detect significant differences with respect to size and competitiveness, we included in the model a covariate term representing cost and investment factors. In fact, two covariate terms were included based on the first two Principal Components obtained from a PCA of all 23 factors. The complete computer output of both the PCA and ANOVA runs is given in Volume 2.

The ANOVA results revealed that system size and competitive status produced a highly significant interactive effect on ARIEPS. Consistent with findings discussed previously, there is no evidence of a competitive effect for large systems, here defined as systems serving more than 15,000 subscribers. However, ARIEPS for competitive franchises are significantly lower at each of the other two size levels. The ANOVA results are summarized in Table 6; values given in the table are estimates (least-squares means) that are appropriate for (i) unequal cell sizes (that is, the different number of franchises among the six categories), and (ii) accounting for the cost/investment measures introduced as a covariate.

Table 6. Analysis of Variance Results (Least-Squares Means)

	Noncompetitive		Competitive	
Size Category	No. of Obs.	ARIEPS	No. of Obs.	ARIEPS
Small	184	$20.83	19	$15.00
Medium	83	$21.94	14	$16.59
Large	103	$22.11	17	$21.84

The implication of this analytical finding is two-fold;

(i) There is evidence that ARIEPS monotonically increases with system size; the (very) small systems serving less than 3,000 subscribers exhibit significantly lower revenue regardless of competitive status; and

(ii) Due to the statistical significance of the interactive effect, comparisons of main-effects (i.e., competitive versus noncompetitive) are misleading; benchmark comparisons must necessarily and explicitly take into account system size in order to be meaningful.

4. Regression Diagnostics and Robustness of FCC Analysis

Regression has many useful applications, one of which is to associate a cause (e.g., competitiveness) with an effect (e.g., lower average revenue) as the FCC purports to have done. However, as with any analytically-sound technique, implicit in its use is strict adherence to key underlying assumptions. While it is true that all assumptions are rarely met in practice, it is nonetheless of critical importance that data analysts and decision-makers alike recognize the impact of potentially serious violations of assumptions necessary for results to be valid.

Recent publications in the statistical literature deal extensively with techniques for assessing validity. Two of the more popular texts are *Regression Diagnostics* by Belsley, Kuh and Welsch (Wiley, 1990) and *Robust Regression and Outlier Detection* by Rousseeuw & Leroy (Wiley, 1987). Although the procedures discussed in these texts are highly technical and require specialized expertise in their application, the implementation of the FCC regression model as a "predictor" or benchmark for setting rates more than justifies their relevance and consideration. It is not uncommon to hear that "statistics can prove just about anything"; nor, unfortunately, is data-dredging an infrequent occurrence. In light of these, as well as more constructive criticisms, it is extremely important that the FCC sample data, regression analysis, and subsequent results be subjected to a comprehensive treatment of diagnostic techniques currently available in the statistical literature as cited above.

A thorough application of diagnostic procedures is time-consuming and it was beyond the scope of our assignment. Nevertheless, we have attempted to identify outliers, i.e., spurious observations, influential data points, and sources of collinearity that, if present and undetected, could seriously affect model stability.

We address the following fundamental concerns:
(i) The effect of weighting observations (i.e., franchises) according to size;
(ii) Problematic statistical issues inherent in the FCC analysis;
(iii)The use and interpretation of some standard regression diagnostic techniques.

Weighting by Size - Much of the discussion and controversy surrounding the use of the model as a benchmark focuses on the "size" issue. The model is derived from franchises that represent a disproportionately small number of subscribers served by the cable industry. One way to compensate for this imbalance is to weight each observation according to the number of subscribers served by the system that operates the franchise. In effect, instead of exerting equal influence on the derivation of regression coefficients, a franchise representing 20,000 subscribers is considered ten times more influential than a counterpart representing 2,000 subscribers. Stated another way, the analysis is equivalent to using ten observations for the former and one for the latter as input to the analysis.

In Table 7, we present the results of the FCC model when weighting each of the 420 observations according to size. The key result here is that the coefficient associated with the OVL term, used by the FCC to quantify the competitive effect, essentially disappears; that is, the estimated coefficient is 0.0016 with a relatively large standard error of 0.033.

> **As a consequence, OVL (or, equivalently, competition in the FCC definition) has no explanatory power whatsoever with respect to ARIEPS (revenue).**

The implication of this finding is crucial to the FCC argument. By directly accounting for size in the data, it is not surprising that a totally different outcome has been observed. Furthermore, the influence of the make-up of the data set used to derive the model has been demonstrated to have a significant impact on the value and interpretation of individual coefficients in the model. It is this type of data-sensitivity that often (and justifiably) casts doubt on a strict interpretation of individual regression coefficients.

Problematic Statistical Issues - In addition to the issue of representativeness of sampled franchises, several other fundamental concerns should be addressed. For example, the OVL term is critical to the FCC claim that competition effectively reduces ARIEPS. Furthermore, the effect is quantified to be approximately 17%. However, theory dictates (and most practitioners acknowledge) that independent variables used in regression models should be measured precisely (i.e., without error). In varying degrees, several of the thirteen terms used in the FCC model are subject to uncertainty; the problem seems particularly acute when quantifying OVL. In fact, as discussed elsewhere, OVL is known to have been incorrectly specified for some of the franchises contacted in our survey.

Another common difficulty encountered in regression is the condition of collinearity. Collinearity occurs when explanatory variables themselves, assumed to be independent, are correlated in the statistical sense. This condition, if it exists, can cause havoc on the interpretation of individual coefficients, namely, OVL. Correlation tables given in Volume 2 reveal that OVL is correlated with other terms in the model, indicating that caution should be exercised in interpreting coefficients that supposedly isolate the effect attributable to a competitive environment.

Table 7. FCC Regression with Observations Weighted According to Size

NCTA - Analysis of Survey Results 08:46 Tuesday, May 24, 1994 1
Regression - FCC model

Model: MODEL1
Dependent Variable: LAR

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	13	9.54798	0.73446	21.048	0.0001
Error	406	14.16692	0.03489		
C Total	419	23.71490			

Root MSE	0.18680	R-square	0.4026
Dep Mean	3.09489	Adj R-sq	0.3835
C.V.	6.03573		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|	Variance Inflation
INTERCEP	1	2.327475	0.21715957	10.718	0.0001	0.00000000
A1	1	-0.036631	0.01400663	-2.615	0.0092	1.15162914
OVL	1	0.001609	0.03271645	0.049	0.9608	1.28036762
C	1	-0.310389	0.11129948	-2.789	0.0055	1.02678762
MSO	1	-0.045196	0.03366448	-1.343	0.1802	1.53227544
LMS	1	0.003408	0.00364090	0.936	0.3498	1.47631336
RSS	1	14.896592	19.32380616	0.771	0.4412	1.07395613
RTC	1	-3.418992	1.02866834	-3.324	0.0010	1.39188559
PNB	1	0.215312	0.10589860	2.033	0.0427	1.73554569
PAO	1	0.022056	0.01881679	1.172	0.2418	1.32681508
PRM	1	0.190423	0.02483618	7.667	0.0001	1.42997103
PT2	1	0.092545	0.01901554	4.867	0.0001	2.02512396
PTC	1	0.040798	0.13081441	0.312	0.7553	1.12087355
LIN	1	0.061816	0.01676105	3.688	0.0003	1.58045409

Another major concern involves the data set itself. Even if all measures were reasonably accurate (which has been demonstrated not to be the case), there is further evidence that subsets of the data have a disproportionate influence on the FCC estimated model. The importance of influential observations is emphasized in the following quote, extracted from the aforementioned text authored by Belsley, Kuh and Welsch (page 3):

> "The fact that a small subset of the data can have a disproportionate influence on the estimated parameters or predictions is of concern to users of regression analysis, for, if this is the case, it is quite possible that the model estimates are based primarily on this data subset rather than on the majority of the data."

While the authors point out that unusual or influential data points are not necessarily bad, it is only after they have been identified that their quality can be assessed and appropriate action taken. In the context of the rate-setting application, it is important that such data points be appropriately handled.

Regression Diagnostics - Our regression output generated by the SAS PROC REG software package includes an array of diagnostic measures. Criteria for interpreting these measures are discussed in the literature and will not be explained here. As a simple illustrative example, one of the measures (the studentized residual) provides insight concerning observations (franchises) that yield extreme discrepancies between actual ARIEPS and the corresponding value estimated by the model. A few of the differences that are highly significant are listed in Table 8.

Table 8. Sample Franchises with Large Prediction Error

Franchise	ARIEPS (Actual)	ARIEPS (Predicted)	Residual (Difference)	
XX 0003	$ 7.50	$18.23	-$10.73	
MO 0373	$11.80	$22.79	-$10.99	
AL 0127	$11.07	$19.49	-$ 8.42	Model *Over-* Predicts
GA 0025	$13.71	$22.14	-$ 8.43	
GA 0025	$13.48	$20.09	-$ 6.61	
KY 0007	$10.22	$16.41	-$ 6.19	
NJ 0373	$29.58	$17.66	+$11.92	
NJ 0373	$26.95	$19.12	+$ 7.83	Model *Under-* Predicts
NH 0019	$35.84	$22.55	+$13.29	
NY 1414	$32.23	$21.85	+$10.38	
CA 1119	$28.05	$19.28	+$ 8.77	

In addition to the fact that the FCC model is obviously a poor predictor of revenue for these few franchises, inspection of other diagnostic measures (not included here) suggested that several of these franchises were indeed highly influential. This does not necessarily imply that they should have been deleted, but it does suggest a need to *verify the data* collected for these franchises.

It was not the intent of our assignment to conduct a thorough diagnostic evaluation of the FCC regression model. If it were, we would have first eliminated apparent errors in the data base, and subsequently attempted to reconcile other discrepancies that have been detected. Rather, the purpose of this discussion is to emphasize the possible significance of potential data problems to the FCCs estimation of the competitive price differential, and to pinpoint the estimated coefficients (primarily the one associated with the OVL term) that are potentially most adversely affected.

Appendix 2
Survey of Competitive Franchises

Appendix 2
Interview Guide

Interview Guide

pds/24April94

Objective

Arthur D. Little Inc. is helping NCTA and CATA respond to the FCC's rulemaking on cable TV rates. The FCC based its new rules on cable system rates and services as of September 1992. Our questions concerning your system will help NCTA and CATA comment on the FCC's approach.

FACILITIES

1. What addressable & non-addressable converters are in your system? (CHECK DATASHEET ON ADDRESSABILITY)
   - Suppliers &Model numbers?
   - How obtained: Purchased new? Used? Transferred from other systems?
   - When obtained?
   - Proportions of subscribers having each model of converter? Do these proportions differ for franchise area vs. overall system?
   - Changes since September 1992?

2. What is the channel capacity of your system in the franchise area? (CHECK DATASHEET ON CHANNEL CAPACITY)
   - How many channels activated?
   - Differences between franchise area and overall system?
   - Differences between overbuilt portions and rest of franchise area?
   - Change in channel capacity since September 1992?

3. Do you have a local origination or public access studio?
   - Cost to set up this studio? When built?

4. Do you operate any other facilities required by the franchise agreement, e.g., institutional network for town government, or for schools?
   - Cost to build these facilities? When constructed?

5. When was the franchise area constructed? (CHECK DATASHEET ON AGE OF HEADEND)
   - Rebuilds & upgrades since original construction? When? What $/mile on average?

6. Was franchise area constructed or acquired by current owner?
   If acquired:
   - Purchase price? Date of purchase? Subscribers at time of purchase? Existence of overbuild at time of purchase? (CHECK DATASHEET FOR NOTES ON OVERBUILD)

   If constructed:
   Original capital investment for the system in terms of:
   - $/mile?
   - $/Home passed?
   - $/Subscriber
   - Differences for franchise area vs. overall system?

GET NAME & PHONE NUMBER OF COMPANY ENGINEER OR OTHER SOURCE ON CAPITAL INVESTMENT IF THEY CAN ADD MORE INFORMATION.

OPERATIONS

7. How many satellite-delivered cable networks are you providing? (CHECK DATASHEET)
   - How many in tiers above basic?
   - Proportions of subscribers for higher tiers?
   - Differences between franchise area and overall system?
   - Changes since September 1992?

8. How many subscribers for basic? and for each higher tier?
   - How much subscriber churn (%) each year?
   - In franchise area versus overall system?
   - Changes since September 1992?

9. How many employees in the system?
   - In the franchise area (if counted separately)?
   - Number of customer service representatives (CSRs)? System vs. franchise area?
   - Field employees (technicians, installers, supervisors)? System vs. franchise area?
   - Changes since September 1992?

10. Current rates for basic and for each higher tier, per month?(CHECK DATASHEET ON RATES & COMMUNITIES SERVED)
    - Rates for equipment rental?
    - Difference between franchise area vs. other parts of system in surrounding areas?
    - Rate changes since September 1992?

11. Financial performance:
    - Average revenues per subscriber?
    - Average operating expenses per subscriber?
    - Average cash flow per subscriber? or CF margins? (CASH FLOW = INCOME BEFORE DEBT SERVICE, DEPRECIATION, CAPITAL INVESTMENT & TAXES)
    - Revenues per subscriber from *regulated* basic & satellite programming tiers, excluding non-regulated pay cable or other sources?
    - Annual depreciation expense?
    - Differences for franchise area vs. overall system?
    - Changes since September 1992?

SPECIAL CONDITIONS

12. Special conditions in franchise area:
    - Financial situation for one or both systems?
    - Significant rate changes?
    - Changes in system plant and/or services?
    - Special features of overbuilt areas vs. entire franchise areas?

Appendix 2
Franchise Operational Data

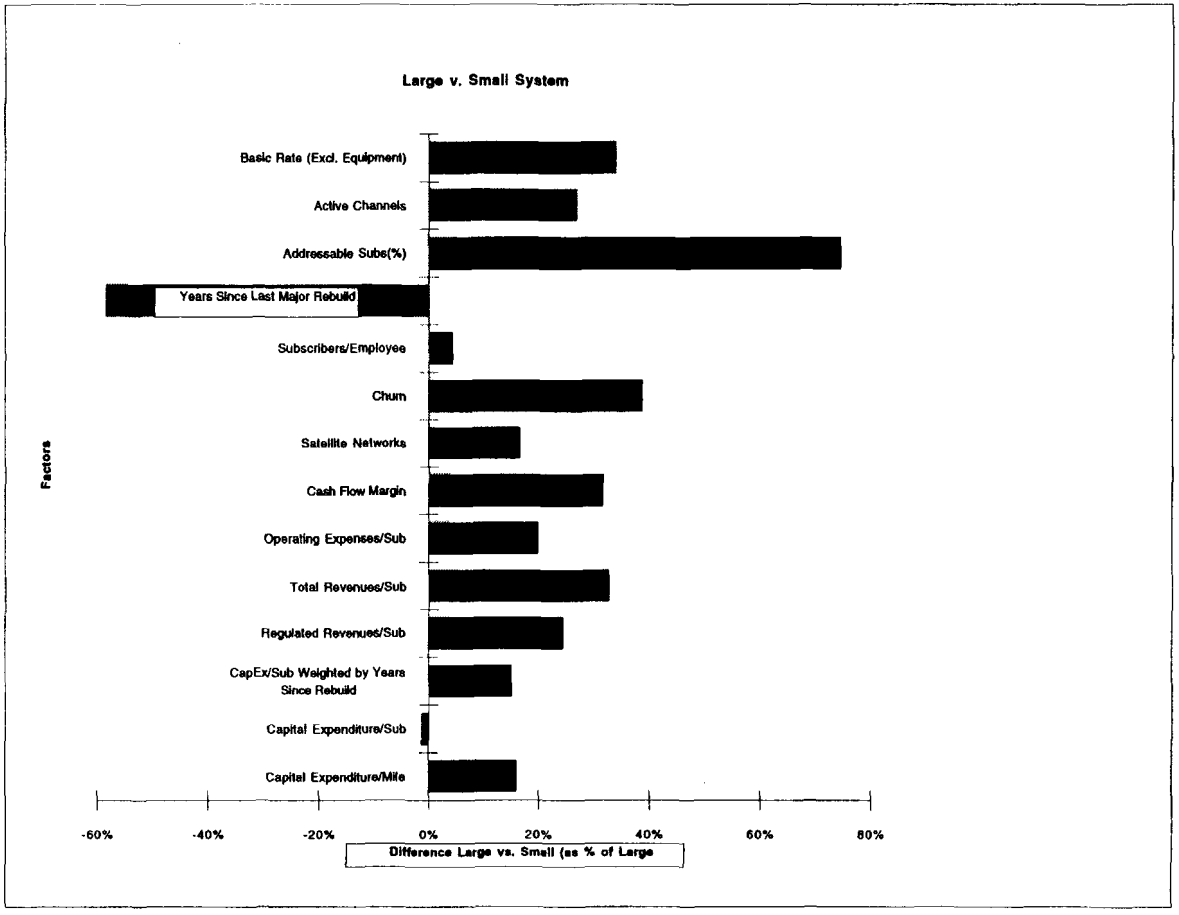
Large Vs. Small Systems- Results of ADLittle Survey

ADL Survey Results		Subs (Frnch)	Subs (Sys)	CapEx/Mile	CapEx/Sub	CapEx*Age/Sb	RgltdReva/Sub	Reva/Sub	Expenses/Sub	CFMargin	SatNets	Churn	Subs/Empl	Age-Bld/Rbld	AddrSubs(%)	ActvChnls	BasicRate	BasicRate Incr
Large	Average-->	5044	42543	$21,433	$670	$344	$264.65	$376.27	$222.56	40%	34	24%	547	5	41%	54	$22.33	$1.94
Small	Average-->	1117	1990	$17,983	$679	$292	$199.79	$253.06	$178.25	27%	28	15%	524	8	10%	40	$14.77	$0.23

Differences	Subs (Frnch)	Subs (Sys)	CapEx/Mile	CapEx/Sub	CapEx*Age/Sb	RgltdReva/Sub	Reva/Sub	Expenses/Sub	CFMargin	SatNets	Churn	Subs/Empl	Age-Bld/Rbld	AddrSubs(%)	ActvChnls	BasicRate	BasicRate Incr
Large-minus-Small (N)	3927	40552	$3,449	($9.05)	$51.94	$64.86	$123.20	$44.31	13%	6	9%	23	-3	31%	15	$7.56	$1.71
Difference v. Large (%)	78%	95%	16%	-1%	15%	25%	33%	20%	32%	17%	39%	4%	-58%	75%	27%	34%	88%

Capital Coverage- (CapEx per Sub)/(Cash Flow per Sub)

Large Systems	4
Small Systems	9



Franchisee	>5K Subs	Subs (Fr)	Subs (Sys)	CapEx/Mile	CapEx/Sub	CapEx*Age/Sb	Revs/Sub	RegRevs/Sub	Exp/Sub	CFMargin	SatNets	Churn	Subs/Empl	Age Bld/Rbld	AddrSubs(%)	Chnls	Actv.	BasicRate	BasicRateCh
AL0012	>5K	23314	23314								47	31%	460		21%		60	$21.50	$6.00
AL0371	>5K	16235	26613								52		459	8	44%		63	$19.50	$4.00
CA0751	>5K	9100	9100								43	3%	650	8	0%		61	$21.95	$3.00
FL0679	>5K	1890	16064								35	30%	396	1	18%		42	$21.16	$2.21
KY0542	>5K	10273	58956								28		454	11	45%		82	$20.76	$0.16
KY0867	*From Smalls	3560	5300								28		324	8	75%		44	$28.80	$0
MD0009-W	>5K	11024	26067								45	38%	592	6	89%		62	$27.96	$2.20
MD0009-D	>5K	500	26067								45	38%	592	6	89%		62	$27.96	$2.20
NE0111	>5K	4329	89228								45	26%	399	10	94%		55	$22.57	$2.82
NJ0373-H	>5K	1249	49124								16	20%	692	0.01	38%		42	$24.67	$1.72
NJ0373-P	>5K	2799	49124								16	17%	692	0.01	38%		42	$24.67	$1.72
NJ0404	>5K	1345	199333								27	8%	523	1	26%		62	$23.00	$2.55
OH0264-J	>5K	5878	26500								25		803	5	33%		52	$19.00	$1.00
OH0264-T	>5K	782	26500								25		803	5	33%		52	$19.00	$1.00
PA0478	>5K																		
PA0478	>5K																		
PA0552h	>5K	1849	63500										435				65	$21.15	$2.65
PA0552e	>5K	3600	63500										435				65	$21.15	$2.65
SC0527	*From Smalls	1927	5296								26		662		0%		41	$15.62	($1.38)
WI0621	>5K	202	56000								35	24%	373		65%		48	$20.65	($0.30)
WI0650	>5K	700	10566								45	20%	556	7	0%		45	$23.95	$1.00
XX0002	>5K																		
MI0011	>5K	332	20705								26	35%	518	1	10%		44	$21.54	$3.61
	Average-->	5044	42543	$21,433	$670	$344	$376	$265	$223	40%	34	24%	547	5	41%		54	$22.33	$1.94

Franchisee	<5k Subs	Subs (Fr)	Subs (Sys)	CapEx/Mile	CapEx/Sub	CapEx*Age/Sb	Revs/Sub	RegRevs/Sub	Exp/Sub	CFMargin	SatNets	Churn	Subs/Empl	Age Bld/Rbld	AddrSubs (%)	Chnls	Actv.	BasicRate	BasicRateCh
AL0127		2415	3388								36	33%	344	7	0%		42	$9.95	$0
AL0380-B		329	3053								47	2%	339	8			59	$14.00	$0
AL0380-T		2208	3053								47	2%	339	8			59	$14.00	$0
GA0025-L		664	3810								28		526	19	3%		37	$13.45	$0.55
GA0025-V		2517	3810								28		526	19	2%		37	$13.45	$0.55
GA0757		1550	2439								35	55%	610	6	40%		51	$15.75	$0.00
GA0881		146	146								15		553	4	0%		20	$17.00	$0
IL0883		190	190								28	18%	786	7	0%		36	$18.40	$0
IL1474																			
IN0531		280	4300								24		662	10	0%		40	$21.97	$2.52
KY0867	*To Larges																		
LA0085		2711	3525								45	26%	589	3	0%		60	$16.00	$0
LA0515																			
OR0146		75	2069								19	2%	690	15	4%		35	$18.50	$1.11
OR0258		540	932								20	15%	311	15	0%		31	$13	$1.50
SC0527	*To Larges																		
UT0098		156	156								15	0%	780	7	0%		25	$17.53	$0.03
VA0560		467	1467								40		367	2	50%		54	$14.95	$0
XX0022		758	808								30	3%	808	6	0%		46	$16.95	$3.00
AR0026		4745	4745								40	38%	408	6	23%		54	$10.50	$0
AR0576		4136	4136								28	25%	995	2	97%		58	$12.50	$0
KY1009																			
MI1005																			
MN0049		527	527								27				0%		36	$14.95	$0
MN0115		58	338								8		316	20	0%		18	$10.95	$0
MN0182		28	28								15	0%	140	6	0%		25	$11.95	($4.00)
MN0802		527	527								27		580	4	0%		36	$14.95	$0
MN0839		330									15	2%	550	3	0%		15	$13.95	$0
MN0891		343	343								32	2%	298	2	0%		42	$15.00	$0
	Average-->	1117	1990	$17,983	$679	$292	$253	$200	$178	27%	28	15%	524	8	10%		40	$14.77	$0.23

Appendix 3
Financial Analyses

Appendix 3
Franchise Financial Data

Arthur D. Little Survey of Competitive Franchises: Financial Data

Jun-94

FRANCHISES	CapEx/Mile	CapEx/Sub	Weighted CapEx/Sub	Revs/Sub	RegRevs/Sub	Exp/Sub	CFMargin
QQ111	$8,600	$784	$392	$243	$203	$195	20%
QQ113	$15,000	$1,521	$634	$370	$293	$179	52%
QQ114				$366		$204	44%
QQ115	$13,728	$706	$588	$226		$172	24%
QQ116				$247		$192	22%
QQ117				$261	$177	$185	29%
QQ122			$0	$192			
QQ123			$0	$325	$226	$172	47%
QQ124	$13,000	$600	$350	$305	$244	$165	46%
QQ125	$13,000	$251	$146	$360	$244	$165	54%
QQ126	$24,378	$790	$724	$457	$232	$224	51%
QQ127	$23,000	$374	$374	$498	$287	$242	51%
QQ128	$23,000	$374	$374	$498	$287	$242	51%
QQ129	$29,629	$425	$71	$380	$254	$233	39%
QQ130	$20,000	$459	$230	$435	$343	$267	39%
QQ131	$20,000	$360	$180	$430	$337	$267	38%
QQ133	$7,083	$305	$229	$315	$249	$157	50%
QQ134	$16,000	$875	$292	$336		$240	29%
QQ135	$50,289	$1,072	$89	$333		$227	32%
QQ136	$7,000	$375	$63	$339		$166	51%
QQ138				$291	$223	$129	55%
QQ139	$12,000	$822	$548	$321		$164	49%
QQ140	$20,000	$902	$451	$261		$180	31%
QQ141			$0	$270		$205	24%
QQ142			$0	$270		$205	24%
QQ143				$338	$228	$230	32%
QQ144				$354	$250	$248	30%
QQ145		$650	$217	$306		$222	27%
QQ146		$650	$217	$306		$222	27%
QQ147	$21,828	$812	$271	$348		$228	34%
QQ148				$213		$202	5%
QQ149				$369		$274	26%
QQ150	$41,000	$656	$547	$235		$185	21%
QQ151	$36,000	$545	$409	$188	$167	$132	30%
QQ152	$21,923	$983	$655				
QQ153				$150		$120	20%
QQ154			$0	$158	$131	$206	-30%
QQ157	$9,500	$801	$734	$336		$186	45%
QQ159	$12,500	$774	$645	$206		$161	22%

Arthur D Little

Appendix 3
Financial Performance Models

Cable Financial Returns: Competitive Systems

Financial Assumptions			
Interest Rate		8.50%	FCC Rpt& Order, Docket 93-215, 30Mar94, p102
Debt Leverage on Capital Investment		50%	FCC Rpt& Order, Docket 93-215, 30Mar94, p106-108
Debt Repayment			
Starting Year		3	
Term		9	
Overall Rate of Return (AfterTax)		11.25%	FCC Rpt& Order, Docket 93-215, 30Mar94, p108
After Tax Return to Equity		14%	Derived as in FCC Rpt& Order, Docket 93-215, 30Mar94, p108: Eq.Ret=(Avg Return-(%Debt*Debt Cost))/%Equity
Plus Allowed Return for Tax @ Rate=	34%	7.21%	Gross up as in FCC Rpt& Order, Docket 93-215, 30Mar94, p83. Formula: Gross up = ((Tax rate/(1-Tax Rate))* Rate of return
Equity Rate of Return (PreTax)		21.21%	
Terminal Multiple of Cash Flow		9	CF Multiple = 1/Rate of Return

		ADL Code
Cable Franchise		
Initial Capital Expenditure per Subscriber	$784	QQ111
Annual Capital per Subscriber	$0	Assumed
Revenue per Subscriber	$243	QQ111
Expenses per Subscriber	$195	QQ111
Cash Flow per Subscriber	$48	QQ111
Cash Flow growth assumption (per Yr)	1%	Real growth - assumed

Financial Performance	Year-->	1	2	3	4	5	6	7	8	9	10
Annual cash flows		$48	$48	$49	$49	$50	$50	$51	$51	$52	$52
Plus Terminal Cash											$467
Total Cash flows		$48	$48	$49	$49	$50	$50	$51	$51	$52	$519
Interest Cost		$17	$33	$31	$26	$21	$17	$12	$7	$2	$0
Net CF Available for Debt Repayment		$31	$15	$18	$23	$29	$34	$39	$44	$50	$519
Debt Repayment		$0	$0	$56	$56	$56	$56	$56	$56	$56	$0
Annual Net CF for Equity Returns	($392)	$31	$15	($38)	($33)	($27)	($22)	($17)	($12)	($6)	$519
IRR to Equity	0%										
NPV Per Subscriber											
w/Discount Rate= 21%	($282)										

Debt Repayment/Interes

	Year---> 0	1	2	3	4	5	6	7	8	9	10
Debt as % Investment=	50%										
Annual Investment ($)		784	0	0	0	0	0	0	0	0	0
New Debt ($/year)		392	0	0	0	0	0	0	0	0	0
New Debt (cum)		392	392	392	392	392	392	392	392	392	392
DEBT REPAYMENTS											
New Debt											
new in year 1		0	0	56	56	56	56	56	56	56	0
new in year 2			0	0	0	0	0	0	0	0	0
new in year 3				0	0	0	0	0	0	0	0
new in year 4					0	0	0	0	0	0	0
new in year 5						0	0	0	0	0	0
new in year 6							0	0	0	0	0
new in year 7								0	0	0	0
new in year 8									0	0	0
new in year 9										0	0
new in year 10											0
new in year 11											
new in year 12											
new in year 13											
new in year 14											
new in year 15											
DEBT REPAYMENT ($/yr)		0	0	56	56	56	56	56	56	56	0
DEBT REPAYMENT ($ cum)		0	0	56	112	168	224	280	336	392	392
PRINCIPAL OUTSTANDING(eoy)		392	392	336	280	224	168	112	56	0	0
INTEREST ($/Year)		17	33	31	26	21	17	12	7	2	0

Cable Financial Returns: Competitive Systems

Financial Assumptions

Interest Rate		8.50%	FCC Rpt& Order, Docket 93-215, 30Mar94, p102
Debt Leverage on Capital Investment		50%	FCC Rpt& Order, Docket 93-215, 30Mar94, p106-108
Debt Repayment			
Starting Year		3	
Term		9	
Overall Rate of Return (AfterTax)		11.25%	FCC Rpt& Order, Docket 93-215, 30Mar94, p108
After Tax Return to Equity		14%	Derived as in FCC Rpt& Order, Docket 93-215, 30Mar94, p108: Eq.Ret=(Avg Return-(%Debt*Debt Cost))/%Equity
Plus Allowed Return for Tax @ Rate=	34%	7.21%	Gross up as in FCC Rpt& Order, Docket 93-215, 30Mar94, p83. Formula: Gross up = ((Tax rate/(1-Tax Rate))* Rate of return
Equity Rate of Return (PreTax)		21.21%	
Terminal Multiple of Cash Flow		9	CF Multiple = 1/Rate of Return

Cable Franchise		**ADL Code**
Initial Capital Expenditure per Subscriber	$656	QQ150
Annual Capital per Subscriber	$0	Assumed
Revenue per Subscriber	$235	QQ150
Expenses per Subscriber	$185	QQ150
Cash Flow per Subscriber	$50	QQ150
Cash Flow growth assumption (per Yr)	1%	Real growth - assumed

Financial Performance	**Year-->**	1	2	3	4	5	6	7	8	9	10
Annual cash flows		$50	$51	$51	$52	$52	$53	$53	$54	$54	$55
Plus Terminal Cash											$486
Total Cash flows		$50	$51	$51	$52	$52	$53	$53	$54	$54	$541
Interest Cost		$14	$28	$26	$22	$18	$14	$10	$6	$2	$0
Net CF Available for Debt Repayment		$36	$23	$25	$30	$34	$39	$43	$48	$52	$541
Debt Repayment		$0	$0	$47	$47	$47	$47	$47	$47	$47	$0
Annual Net CF for Equity Returns	($328)	$36	$23	($22)	($17)	($13)	($8)	($4)	$1	$5	$541

IRR to Equity		5%	
NPV Per Subscriber			
w/Discount Rate=	21%	($191)	

Debt Repayment/Interes

	Year---> 0	1	2	3	4	5	6	7	8	9	10
Debt as % Investment=	50%										
Annual Investment ($)		656	0	0	0	0	0	0	0	0	0
New Debt ($/year)		328	0	0	0	0	0	0	0	0	0
New Debt (cum)		328	328	328	328	328	328	328	328	328	328
DEBT REPAYMENTS											
New Debt											
new in year 1		0	0	47	47	47	47	47	47	47	0
new in year 2			0	0	0	0	0	0	0	0	0
new in year 3				0	0	0	0	0	0	0	0
new in year 4					0	0	0	0	0	0	0
new in year 5						0	0	0	0	0	0
new in year 6							0	0	0	0	0
new in year 7								0	0	0	0
new in year 8									0	0	0
new in year 9										0	0
new in year 10											0
new in year 11											
new in year 12											
new in year 13											
new in year 14											
new in year 15											
DEBT REPAYMENT ($/yr)		0	0	47	47	47	47	47	47	47	0
DEBT REPAYMENT ($ cum)		0	0	47	94	141	187	234	281	328	328
PRINCIPAL OUTSTANDING(eoy)		328	328	281	234	187	141	94	47	0	0
INTEREST ($/Year)		14	28	26	22	18	14	10	6	2	0

Cable Financial Returns: Competitive Systems

Financial Assumptions			
Interest Rate		8.50%	FCC Rpt& Order, Docket 93-215, 30Mar94, p102
Debt Leverage on Capital Investment		50%	FCC Rpt& Order, Docket 93-215, 30Mar94, p106-108
Debt Repayment			
Starting Year		3	
Term		9	
Overall Rate of Return (AfterTax)		11.25%	FCC Rpt& Order, Docket 93-215, 30Mar94, p108
After Tax Return to Equity		14%	Derived as in FCC Rpt& Order, Docket 93-215, 30Mar94, p108: Eq.Ret=(Avg Return-(%Debt*Debt Cost))/%Equity
Plus Allowed Return for Tax @ Rate=	34%	7.21%	Gross up as in FCC Rpt& Order, Docket 93-215, 30Mar94, p83. Formula: Gross up = ((Tax rate/(1-Tax Rate))* Rate of return
Equity Rate of Return (PreTax)		21.21%	
Terminal Multiple of Cash Flow		9	CF Multiple = 1/Rate of Return

Cable Franchise		**ADL Code**
Initial Capital Expenditure per Subscriber	$774	QQ159
Annual Capital per Subscriber	$0	Assumed
Revenue per Subscriber	$206	QQ159
Expenses per Subscriber	$161	QQ159
Cash Flow per Subscriber	$45	QQ159
Cash Flow growth assumption (per Yr)	1%	Real growth - assumed

Financial Performance	**Year-->**	1	2	3	4	5	6	7	8	9	10
Annual cash flows		$45	$45	$46	$46	$47	$47	$48	$48	$49	$49
Plus Terminal Cash											$437
Total Cash flows		$45	$45	$46	$46	$47	$47	$48	$48	$49	$487
Interest Cost		$16	$33	$31	$26	$21	$16	$12	$7	$2	$0
Net CF Available for Debt Repayment		$29	$13	$15	$21	$26	$31	$36	$41	$46	$487
Debt Repayment		$0	$0	$55	$55	$55	$55	$55	$55	$55	$0
Annual Net CF for Equity Returns	($387)	$29	$13	($40)	($35)	($30)	($24)	($19)	($14)	($9)	$487
IRR to Equity	-1%										
NPV Per Subscriber											
w/Discount Rate= 21%	($290)										

Debt Repayment/Interest

	Year--->	0	1	2	3	4	5	6	7	8	9	10
Debt as % Investment=	50%											
Annual Investment ($)			774	0	0	0	0	0	0	0	0	0
New Debt ($/year)			387	0	0	0	0	0	0	0	0	0
New Debt (cum)			387	387	387	387	387	387	387	387	387	387
DEBT REPAYMENTS												
New Debt												
new in year 1			0	0	55	55	55	55	55	55	55	0
new in year 2				0	0	0	0	0	0	0	0	0
new in year 3					0	0	0	0	0	0	0	0
new in year 4						0	0	0	0	0	0	0
new in year 5							0	0	0	0	0	0
new in year 6								0	0	0	0	0
new in year 7									0	0	0	0
new in year 8										0	0	0
new in year 9											0	0
new in year 10												0
new in year 11												
new in year 12												
new in year 13												
new in year 14												
new in year 15												
DEBT REPAYMENT ($/yr)			0	0	55	55	55	55	55	55	55	0
DEBT REPAYMENT ($ cum)			0	0	55	111	166	221	276	332	387	387
PRINCIPAL OUTSTANDING(eoy)			387	387	332	276	221	166	111	55	0	0
INTEREST ($/Year)			16	33	31	26	21	16	12	7	2	0

Cable Financial Returns: Competitive Systems

Financial Assumptions

Interest Rate		8.50%	FCC Rpt& Order, Docket 93-215, 30Mar94, p102
Debt Leverage on Capital Investment		50%	FCC Rpt& Order, Docket 93-215, 30Mar94, p106-108
Debt Repayment			
Starting Year		3	
Term		9	
Overall Rate of Return (AfterTax)		11.25%	FCC Rpt& Order, Docket 93-215, 30Mar94, p108
After Tax Return to Equity		14%	Derived as in FCC Rpt& Order, Docket 93-215, 30Mar94, p108: Eq.Ret=(Avg Return-(%Debt*Debt Cost))/%Equity
Plus Allowed Return for Tax @ Rate=	34%	7.21%	Gross up as in FCC Rpt& Order, Docket 93-215, 30Mar94, p83. Formula: Gross up = ((Tax rate/(1-Tax Rate))* Rate of return
Equity Rate of Return (PreTax)		21.21%	
Terminal Multiple of Cash Flow		9	CF Multiple = 1/Rate of Return

Cable Franchise		**ADL Code**
Initial Capital Expenditure per Subscriber	$706	QQ115
Annual Capital per Subscriber	$0	Assumed
Revenue per Subscriber	$226	QQ115
Expenses per Subscriber	$172	QQ115
Cash Flow per Subscriber	$54	QQ115
Cash Flow growth assumption (per Yr)	1%	Real growth - assumed

Financial Performance	**Year-->**	1	2	3	4	5	6	7	8	9	10
Annual cash flows		$54	$55	$55	$56	$56	$57	$57	$58	$58	$59
Plus Terminal Cash											$525
Total Cash flows		$54	$55	$55	$56	$56	$57	$57	$58	$58	$584
Interest Cost		$15	$30	$28	$24	$19	$15	$11	$6	$2	$0
Net CF Available for Debt Repayment		$39	$25	$27	$32	$37	$42	$47	$51	$56	$584
Debt Repayment		$0	$0	$50	$50	$50	$50	$50	$50	$50	$0
Annual Net CF for Equity Returns	($353)	$39	$25	($23)	($18)	($14)	($9)	($4)	$1	$6	$584
IRR to Equity	5%										
NPV Per Subscriber											
w/Discount Rate= 21%	($205)										

Debt Repayment/Interes

	Year---> 0	1	2	3	4	5	6	7	8	9	10
Debt as % Investment=	50%										
Annual Investment ($)		706	0	0	0	0	0	0	0	0	0
New Debt ($/year)		353	0	0	0	0	0	0	0	0	0
New Debt (cum)		353	353	353	353	353	353	353	353	353	353
DEBT REPAYMENTS											
New Debt											
new in year 1		0	0	50	50	50	50	50	50	50	0
new in year 2			0	0	0	0	0	0	0	0	0
new in year 3				0	0	0	0	0	0	0	0
new in year 4					0	0	0	0	0	0	0
new in year 5						0	0	0	0	0	0
new in year 6							0	0	0	0	0
new in year 7								0	0	0	0
new in year 8									0	0	0
new in year 9										0	0
new in year 10											0
new in year 11											
new in year 12											
new in year 13											
new in year 14											
new in year 15											
DEBT REPAYMENT ($/yr)		0	0	50	50	50	50	50	50	50	0
DEBT REPAYMENT ($ cum)		0	0	50	101	151	202	252	303	353	353
PRINCIPAL OUTSTANDING(eoy)		353	353	303	252	202	151	101	50	0	0
INTEREST ($/Year)		15	30	28	24	19	15	11	6	2	0